

REMARKS

This response is submitted to the Office Action mailed June 30, 2004 rejecting claims 15 and 21-23 in the above-identified patent application.

Reconsideration is respectfully requested in view of the following remarks.

Claims 15 and 21-23 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Lin 6,483,147 in view of newly cited Buynoski 6,190,985. Lin is again cited by the Examiner as disclosing a SOI substrate 40 having a silicon substrate 12, a silicon oxide layer 34 formed on the substrate 12, and a silicon device layer 32 overlying the silicon oxide layer, a semiconductor component MOSFET 42 formed in silicon device layer 32 overlying a conductive plug 38, that is formed in a portion of the substrate 12, a metal layer (50,52) in the portion of the substrate 12 in which silicon has been removed by etching, the metal layer (50,52) abutting the silicon oxide layer 34 and providing heat removal from the semiconductor component 42. The Examiner recognizes that Lin does not disclose a silicon oxide layer electrically insulating the metal layer from the semiconductor component. The Examiner refers to the newly cited Buynoski patent as disclosing silicon oxide layer 34 electrically insulating metal layer 38 from the semiconductor component 32. The Examiner concludes that it would be obvious to one skilled in the art to form the Lin device having silicon oxide layer electrically insulating the metal layer from the semiconductor component such as taught by Buynoski.

This rejection is respectfully traversed. While the Examiner has identified the various components in the Lin structure, and in the Buynoski et al. device, the Examiner is not reading the recited elements on claim 15. In particular, element c) of claim 15 specifies a metal in the portion of the substrate in which silicon has been removed by etching, the metal layer abutting the silicon oxide layer. The plug 38 of Buynoski does not abut the silicon oxide layer 34, as claimed, rather plug 38 abuts a separate metal layer 14 in the SOI structure.

Indeed, Buynoski discloses the use of two separate heat sinks in his SOI structure, namely the metal layer 14 which is deposited over the bulk silicon substrate 12 and a separate heat sink, either 36 or 38, to the metal layer heat sink 14.

Note also that the metal layer 14 of Buynoski is formed of a metal selected from chromium, molybdenum, titanium, and tantalum (column 5, lines 4-10) while the conductive plug 38 can be made of copper, gold, silver, aluminum, and all alloys thereof. Clearly, plug 38 is a different heat sink and comprises different metal than does metal layer 14 which abuts insulating layer 34.

Buynoski specifically describes the conductive plugs as serving to facilitate transfer of heat away from metal base layer with the heat removed via the conductive plugs dissipated in the bulk silicon layer. See column 4, lines 59-64.

In fact, the metal plugs 36,38 are not required in the Buynoski structure, as shown in Figs. 3 and 4 where a single heat sink, metal layer 14 is employed.

The Buynoski structure which employs a metal based layer 14 in the SOI structure is entirely different from and more complicated than the claimed silicon on insulator semiconductor device comprising a semiconductor body including a silicon supporting substrate, a silicon oxide layer supported by the substrate, and a silicon layer overlying the silicon oxide layer. A metal layer corresponding to Buynoski's layer 34 is not needed nor included.

Further, the claimed silicon on insulator semiconductor device has a single heat sink in the metal layer in the portion of the substrate in which silicon has been removed by etching with a metal layer abutting the silicon oxide layer and providing heat removal from the component. Buynoski utilizes metal layer 14 as the heat sink with, optionally, a metal plug 38 functioning as a heat sink for heat sink metal layer 14.

Further, claim 15 specifies that the metal layer in the portion of the substrate in which silicon has been removed by etching abuts the silicon oxide layer electrically insulating the metal layer from the semiconductor component. In Buynoski, plug 38 does not abut the silicon oxide layer, as claimed, since plug 38 abuts and removes heat from metal heat sink layer 14.

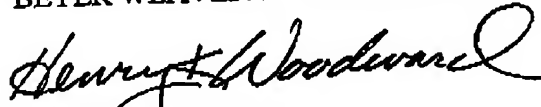
It is respectfully noted that the present Office Action is the sixth substantive action on the application, including two Final Rejections which have been withdrawn. The previous rejections have been based on the Lin reference taken with Takahashi, Lin taken with Udrea, Lin taken with Armbrust, and now Lin taken with Buynoski. It is not seen that Buynoski is any more relevant than the previously cited prior art. Indeed, Buynoski appears to be less relevant in proposing a SOI device structure including two heat sinks (metal layer and metal plug) which complicates the manufacture and resulting structure of the Buynoski device when compared to the claimed silicon on insulator semiconductor device in which a single heat sink is provided by a metal layer in a portion of the substrate in which silicon has been removed by etching with the metal layer abutting the silicon oxide layer and providing heat removal from the component.

For the forgoing reasons, it is respectfully submitted that independent claim 15 and dependent claims 21-23 are neither shown nor suggested by Lin taken with Buynoski, singly or combined.

Since claims 15 and 21-23 are patentable under 35 USC § 103(a) over Lin in view of Buynoski, all as above set forth, it is requested that claims 15 and 21-23 be allowed and the application advanced to issue.

Should the Examiner have any questions or comments concerning the present response, the undersigned attorney requests the opportunity of discussing the response with the Examiner. A telephone call to the undersigned attorney is requested.

Respectfully submitted,
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